

# Knobbe Martens Olson & Bear LLP

Intellectual Property Law

2040 Main Street  
Fourteenth Floor  
Irvine, CA 92614  
Tel 949-760-0404  
Fax 949-760-9502  
www.kmnb.com

Note \*

Please call Annette Masiello  
at 703-415-3060 ASAP.  
Thank-you.

June 30, 2004

Called  
07-12-04

No documentation  
supporting  
need for  
expedited services  
Glen A. Nuttall  
Place in file

## CERTIFICATE OF CORRECTIONS BRANCH

Attn: Cecilia Newman, Manager  
P.O. Box 1450  
Alexandria, VA 22313

CERTIFICATE

JUL 08 2004

OF CORRECTION

Re: U.S. Patent No. 6,712,486  
Title: Mounting Arrangement for Light Emitting Diodes  
Issued: March 30, 2004  
Our Reference No.: PERMLT.019A

Dear Ms. Newman:

On April 21, 2004, we filed a Certificate of Correction for U.S. Patent No. 6,712,486. We contacted the Certificate of Corrections Branch on June 23, 2004, and a staff member confirmed that the Certificate of Correction had been received, but had not yet been assigned to a Certificate of Correction Coordinator. I left a message with Marietta Joyce on the same day, but have not heard back.

Due to a U.S. Patent Office error in printing, several allowed claims were not printed in the patent. Competitors of the patent owner (our client) are currently infringing the claims that were mistakenly not included in the printed patent. These claims are vital to our client's patent infringement lawsuits against such infringing competitors. Unfortunately, we cannot move forward in lawsuits to enforce this patent until the Certificate of Correction is issued. Thus, it is imperative that the Certificate of Correction issue as soon as possible.

Since this matter is extremely urgent, we have asked Annette Masiello to coordinate the processing and issuance of the Certificate of Correction on an expedited basis. Please work with Annette to process and issue a Certificate of Correction on an expedited basis.

San Diego  
619-235-8550

San Francisco  
415-954-4114

Los Angeles  
310-551-3450

Riverside  
909-781-9231

San Luis Obispo  
805-547-5580

Ms. Cecilia Newman

June 30, 2004

Page -2-

Thank you for your assistance in this matter.

Sincerely,

A handwritten signature in black ink, appearing to read 'G. Nuttall', written in a cursive style.

Glen L. Nuttall

Registration No. 46,188

MAIL STOP CERTIFICATE OF CORRECTION BRANCH  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

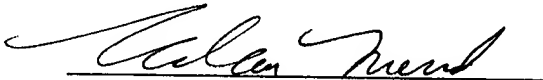
**CERTIFICATE OF MAILING BY "EXPRESS MAIL"**

**Attorney Docket No.** : PERMLT.019A  
**Applicant(s)** : John Popovich, et al.  
**For** : MOUNTING ARRANGEMENT FOR LIGHT  
EMITTING DIODES  
**Attorney** : Glen L. Nuttall  
**"Express Mail"**  
**Mailing Label No.** : EV 309089167  
**Date of Deposit** : April 21, 2004

I hereby certify that the accompanying

Certificate of Correction; Exhibit A; Exhibit B; Exhibit C; Return Prepaid  
Postcard

are being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 on the date indicated above and are addressed to the Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

  
Nelson Merida

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042104

# **Knobbe Martens Olson & Bear LLP**

*Intellectual Property Law*

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**Glen L. Nuttall**

April 21, 2004

Certificate of Correction Branch  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Re: Title: Mounting Arrangement for Light Emitting Diodes  
Letters Patent No.: 6,712,486  
Issued: March 30, 2004  
Our Reference No.: PERMLT.019A

Dear Sir:

Enclosed for filing is a Certificate of Correction in duplicate in connection with the above-identified patent. The Certificate of Correction adds several claims and several references that were mistakenly not included in the printed patent. The certificate of Correction adds Claims 64-89, which were allowed by the Examiner. Attached as Exhibit "A" is a copy of the Supplemental Notice of Allowability mailed by the Patent Office on January 14, 2004, in which the Examiner clearly states that all of Claims 1-89 are allowed. Also attached as Exhibit "B" is a copy of a Supplemental Amendment that was filed by Applicants on July 29, 2003, and which lists all of Claims 1-89 in their allowed form. All of these claims should have been printed in the patent as issued.

The Certificate of Correction also lists several U.S. Patent Documents that were considered by the Examiner, but were not printed in the "References Cited" portion of the patent. Attached as Exhibit "C" are copies of several Forms 1449, which show that each of these references was considered and "signed off" by the Examiner. Since the Examiner considered each of the listed references during prosecution of the application, these references should have been printed in the "References Cited" section of the patent.

Certificate of Correction Branch

April 21, 2004

Page -2-

As the errors cited in the Certificate of Correction were incurred through the fault of the Patent Office, no fee is believed to be required. However, please charge our deposit account no. 11-1410 for any fees that may be incurred with this request.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'Glen L. Nuttall', written over a horizontal line.

Glen L. Nuttall

Registration No.: 46,188

Enclosures

H:\DOCS\GLN\GLN-7571.DOC:sh.ca  
040904

# UNITED STATES PATENT AND TRADEMARK OFFICE

## CERTIFICATE OF CORRECTION

**PATENT NO.** : 6,712,486  
**DATED** : March 30, 2004  
**INVENTOR(S)** : John Popovich, et al.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Front Page,

The following references are added to the "References Cited" section under "U.S. Patent Documents":

3,936,686	02/1976	Moore	313/36
4,591,954	05/1986	Kawamura, et al.	
4,720,773	01/1988	Ahroni	362/249
4,761,720	08/1988	Solow	
5,103,382	04/1992	Kondo, et al.	
5,499,170	03/1996	Gagne	
5,607,227	03/1997	Yasumoto, et al.	
5,660,461	08/1997	Ignatius, et al.	
5,697,175	12/1997	Schwartz	40/552
6,042,248	03/2000	Hannah, et al.	
6,045,240	04/2000	Hochstein	362/294
6,396,466	05/2002	Pross, et al.	345/82
6,505,956	01/2003	Priddy et al.	
6,566,824	05/2003	Panagotacos, et al.	
6,578,986	06/2003	Swaris, et al.	
6,582,103	06/2003	Popovich, et al.	
2001/0015891	08/2001	Suzuki, et al.	362/31

MAILING ADDRESS OF SENDER:

Glen L. Nuttall  
KNOBBE, MARTENS, OLSON & BEAR, LLP  
2040 Main Street, 14<sup>th</sup> Floor  
Irvine, California 92614

PATENT NO. 6,712,486

April 21, 2004

PERMLT.019A  
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040904

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# UNITED STATES PATENT AND TRADEMARK OFFICE

## CERTIFICATE OF CORRECTION

**PATENT NO.** : 6,712,486  
**DATED** : March 30, 2004  
**INVENTOR(S)** : John Popovich, et al.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Column 16,

Line 64, the following claims are added:

64. A light emitting diode (LED) module for mounting on a heat conducting surface that is substantially larger than the module, the module comprising:  
a plurality of LEDs;  
a thin dielectric portion;  
a plurality of electrically-conductive contacts on a first side of the dielectric portion, each of said plurality of contacts being configured to mount an LED such that said plurality of LEDs are electrically connected to one another; and  
a heat conductive body on a second side of said portion, said body having a first side in thermal communication with the plurality of contacts through said dielectric portion, said first side of said body having a surface area substantially larger than a contact area between the contacts and the dielectric portion, a second side of said body having a surface complementary to the heat conducting surface to provide thermal contact with the heat conducting surface, whereby heat is transferred from the LEDs to the heat conducting surface.
65. An LED module as in Claim 64, wherein the surface of the second side of the body is generally flat.
66. An LED module as in Claim 65, wherein the contacts are substantially flat and coplanar relative to each other.
67. An LED module as in Claim 66, wherein the body is substantially flat and parallel to the contacts.

MAILING ADDRESS OF SENDER:

Glen L. Nuttall  
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Irvine, California 92614

PATENT NO. 6,712,486



# UNITED STATES PATENT AND TRADEMARK OFFICE

## CERTIFICATE OF CORRECTION

**PATENT NO.** : 6,712,486  
**DATED** : March 30, 2004  
**INVENTOR(S)** : John Popovich, et al.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

- 68. An LED module as in Claim 64, wherein the heat conducting surface behaves as a heat sink.
- 69. An LED module as in Claim 64, wherein the dielectric portion comprises an epoxy.
- 70. An LED module as in Claim 64, wherein the body has a thermal conductivity greater than about 100 W/mK.
- 71. An LED module as in Claim 70, wherein the body comprises a metal.
- 72. An LED module as in Claim 71, wherein the body comprises aluminum.
- 73. A channel illumination device comprising a plurality of the LED modules of Claim 64 in combination with at least one channel defined by a plurality of wall surfaces and a back surface, wherein the LED modules are mounted on at least one of the surfaces of the channel illumination device.
- 74. A channel illumination device as in Claim 73, wherein the plurality of LED modules are electrically connected in parallel relative to each other.
- 75. A channel illumination device as in Claim 73, wherein the at least one channel surface comprises a heat conducting surface.

MAILING ADDRESS OF SENDER:

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PATENT NO. 6,712,486





# UNITED STATES PATENT AND TRADEMARK OFFICE

## CERTIFICATE OF CORRECTION

**PATENT NO.** : 6,712,486  
**DATED** : March 30, 2004  
**INVENTOR(S)** : John Popovich, et al.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

76. An illuminated sign, comprising:  
a body of thermally conductive material having a thermal conductivity greater than about 100W/mK, said body having a periphery in the shape of an element of said sign; and  
a plurality of light emitting diode (LED) modules disposed on an interior side of said body, the LED modules being electrically connected to one another in parallel, each of the LED modules comprising:

a plurality of LEDs;

a thin dielectric member; and

a plurality of electrically-conductive contacts on a side of the dielectric member, each of the plurality of contacts being configured to mount an LED such that the plurality of LEDs are electrically connected;

wherein each of the LED modules that are attached to the body are mounted so that the dielectric member is disposed between the body and the plurality of contacts, and the body is in thermal communication with the plurality of contacts through the dielectric member so that heat is transferred from the LED module to the body.

77. An illuminated sign as in Claim 76, wherein the dielectric member is substantially planar.

78. An illuminated sign as in Claim 77, wherein the contacts are substantially flat and coplanar relative to each other.

79. An illuminated sign as in Claim 76 additionally comprising a thermally conductive member on a second side of the dielectric member.

80. An illuminated sign as in Claim 79, wherein the thermally conductive member has a thermal conductivity greater than about 100 W/mK.

81. An illuminated sign as in Claim 80, wherein the thermally conductive member is substantially rigid.

MAILING ADDRESS OF SENDER:

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Irvine, California 92614

PATENT NO. 6,712,486



# UNITED STATES PATENT AND TRADEMARK OFFICE

## CERTIFICATE OF CORRECTION

**PATENT NO.** : 6,712,486  
**DATED** : March 30, 2004  
**INVENTOR(S)** : John Popovich, et al.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

82. An illuminated signage system, comprising:  
at least one channel defined by a plurality of wall surfaces and a back surface; and  
a plurality of light emitting diode (LED) modules disposed within the channel and arranged on at least one of the channel surfaces, the LED modules being electrically connected to one another in parallel, each of the LED modules comprising:  
a plurality of LEDs, each LED having at least one lead; and  
a circuit board, comprising a thin dielectric portion, and a plurality of electrically-conductive contacts on a side of the dielectric portion, the plurality of contacts being configured to mount respective leads of an LED such that the plurality of LEDs are electrically connected;  
wherein the LED modules that are attached to the at least one channel surface are mounted so that the channel surface is in thermal communication with the plurality of contacts so that heat is transferred from the LED module to the channel surface.
83. The illuminated signage system of Claim 82 additionally comprising a translucent material extending over the channel.
84. The illuminated signage system of Claim 82, wherein the dielectric portion is disposed between the channel surface and the plurality of contacts.
85. The illuminated signage system of Claim 82, wherein the circuit board comprises a generally flat surface generally complementary to a channel surface.
86. The illuminated signage system of Claim 82, wherein the circuit board is bendable.

**MAILING ADDRESS OF SENDER:**

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PATENT NO. 6,712,486

April 21, 2004  
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# UNITED STATES PATENT AND TRADEMARK OFFICE

## CERTIFICATE OF CORRECTION

**PATENT NO.** : 6,712,486  
**DATED** : March 30, 2004  
**INVENTOR(S)** : John Popovich, et al.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

87. An illuminated signage system, comprising:  
at least one channel defined by a plurality of wall surfaces and a back surface; and  
a plurality of light emitting diode (LED) modules disposed within the channel and attached to at least one of the channel surfaces, the LED modules being electrically connected to one another in parallel, each of the LED modules comprising:  
a plurality of LEDs;  
a circuit board comprising a dielectric portion, the LEDs disposed on a first side of the dielectric portion and arranged such that the plurality of LEDs are electrically connected in series; and  
a heat conductive metal on a second side of the dielectric portion, which heat conductive metal draws LED-generated heat from the first side for dissipation in the channel.
88. The illuminated signage system of Claim 87, wherein the circuit board is interposed between the LEDs and the channel surface.
89. The illuminated signage system of Claim 87, wherein a translucent diffuser extends over the channel.

### MAILING ADDRESS OF SENDER:

Glen L. Nuttall  
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2040 Main Street, 14<sup>th</sup> Floor  
Irvine, California 92614

PATENT NO. 6,712,486

April 21, 2004

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# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/693,548	10/19/2000	John Popovich	PERMLT.019A	7749

20995 7590 01/14/2004

KNOBBE MARTENS OLSON & BEAR LLP  
2040 MAIN STREET  
FOURTEENTH FLOOR  
IRVINE, CA 92614

EXAMINER

TSO, LAURA K

ART UNIT PAPER NUMBER

2875

DATE MAILED: 01/14/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

# Supplemental Notice of Allowability

Application No.

09/893,548

Examiner

Tso

Applicant(s)

POPOVICH ET AL

Art Unit

2875

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--  
All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS. This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to \_\_\_\_\_.
2. ☒ The allowed claim(s) is/are 1-8 & 9.
3. ☒ The drawings filed on 19 October 2000 are accepted by the Examiner.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  - a) ☐ All b) ☐ Some\* c) ☐ None of the:
    1. ☐ Certified copies of the priority documents have been received.
    2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
    3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).
- \* Certified copies not received: \_\_\_\_\_
5. ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
  - (a) ☐ The translation of the foreign language provisional application has been received.
6. ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application. THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

7. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
8. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
  - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
    - 1) ☐ hereto or 2) ☐ to Paper No. \_\_\_\_\_.
  - (b) ☐ including changes required by the proposed drawing correction filed \_\_\_\_\_, which has been approved by the Examiner.
  - (c) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No. \_\_\_\_\_.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the margin according to 37 CFR 1.121(d).

9. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

## Attachment(s)

- |  |   |
|--|---|
| 1 <input type="checkbox"/> Notice of References Cited (PTO-892)  | 5 <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)          |
| 2 <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 6 <input type="checkbox"/> Interview Summary (PTO-413), Paper No. _____             |
| 3 <input checked="" type="checkbox"/> Information Disclosure Statements (PTO-1449 or PTO/SB/08),<br>Paper No. <u>4 pages</u> | 7 <input type="checkbox"/> Examiner's Amendment/Comment                             |
| 4 <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit<br>of Biological Material                    | 8 <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance |
|  | 9 <input type="checkbox"/> Other  |

*Laura Tso*

LAURA K. TSO  
PRIMARY EXAMINER

**PATENT**

Case Docket No. PERMLT.019A

Date: July 29, 2003

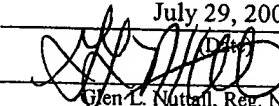
Page 1

In re application of : John Popovich, et al.  
App. No. : 09/693,548  
Filed : October 19, 2000  
For : MOUNTING ARRANGEMENT FOR  
LIGHT EMITTING DIODES  
Examiner : Laura K. Tso  
Art Unit : 2875

**CERTIFICATE OF MAILING**

I hereby certify that this correspondence and all marked attachments are being deposited with the United States Postal Service as first-class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on

July 29, 2003

  
Glen L. Nuttall, Reg. No. 46,188

**COMMISSIONER FOR PATENTS**  
**P.O. Box 1450**  
**Alexandria, VA 22313-1450**

Sir:

Transmitted herewith is a Supplemental Amendment in the above-identified application.

The fee has been calculated as shown below:

<b>CLAIMS AS FILED</b>						
	<b>CLAIMS REMAINING AFTER AMENDMENT</b>		<b>HIGHEST NO. PREVIOUSLY PAID FOR</b>	<b>PRESENT EXTRA</b>	<b>RATE</b>	<b>ADDITIONAL FEE</b>
Total Claims	89	—	81	= 8 ×	\$9	= \$ 72
Independent Claims	10	—	8	= 2 ×	\$42	= \$ 84
If application has been amended to contain multiple dependent claim(s), then add					0	= \$ 0
<b>FEE FOR THE SUPPLEMENTAL AMENDMENT</b>						\$156
IDS with 2 References						\$180
<b>TOTAL ADDITIONAL FEE FOR THE SUPPLEMENTAL AMENDMENT &amp; IDS</b>						\$336

- (X) The present application qualifies for small entity status under 37 C.F.R. § 1.27.
- (X) An IDS with 2 (two) references enclosed.
- (X) Return prepaid postcard.
- (X) A check in the amount of \$336.00 is enclosed.

**PATENT**

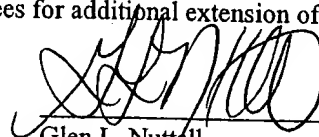
Case Docket No. PERMLT.019A

Date: July 29, 2003

Page 2

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(X) Please charge any additional fees, including any fees for additional extension of time, or credit overpayment to Deposit Account No. 11-1410.



Glen L. Nuttall

Registration No. 46,188

Attorney of Record

Customer No. 20,995

(949) 760-0404

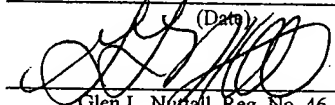
## IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : John Popovich, et al.  
Appl. No. : 09/693,548  
Filed : October 19, 2000  
For : MOUNTING ARRANGEMENT  
FOR LIGHT EMITTING DIODES  
Examiner : Laura K. Tso  
Group Art Unit : 2875

## CERTIFICATE OF MAILING

I hereby certify that this correspondence and all marked attachments are being deposited with the United States Postal Service as first-class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on

July 29, 2003

  
Glen L. Nottall, Reg. No. 46,188

SUPPLEMENTAL AMENDMENT

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Dear Sir:

Supplemental to the Response to Office Action filed by Applicants on July 16, 2003, Applicants respectfully submit the following new claims and remarks in connection with the above-captioned application.



Appl. No. : 09/693,548  
Filed : October 19, 2000

### AMENDMENTS TO THE CLAIMS

Please amend the claims as follows:

1. (Previously Amended) A light emitting diode (LED) module for mounting on a heat conducting surface that is substantially larger than the module, the module comprising:
  - a plurality of LEDs, each LED having at least one lead; and
  - a circuit board, the circuit board comprising:
    - a thin dielectric sheet;
    - a plurality of electrically-conductive contacts on a first side of the dielectric sheet, each of said plurality of contacts being configured to mount a lead of an LED such that said plurality of LEDs is electrically connected; and
    - a heat conductive body on a second side of said sheet, said body having a first portion in thermal communication with the plurality of contacts through said dielectric sheet, said first portion of said body having a surface area substantially larger than a contact area between the contacts and the dielectric sheet, said body having a second portion adapted to provide thermal contact with the heat conducting surface, the second portion having a surface generally complementary to the heat conducting surface, whereby heat is transferred from the module to the heat conducting surface.
2. (Original) The LED module of Claim 1, wherein the contacts are substantially flat and coplanar relative to each other.
3. (Original) The LED module of Claim 2, wherein the plate is substantially flat and parallel to the contacts.
4. (Original) The LED module of Claim 1, wherein each of the contacts has a portion disposed generally adjacent an edge of the circuit board.
5. (Previously Amended) The LED module of Claim 4, wherein the plurality of LEDs are disposed adjacent one edge of the circuit board.
6. (Currently Amended) The LED module of Claim 5, wherein the LEDs additionally comprise lenses for directing light from the LED in a desired direction, and the LEDs are arranged so that light from the LEDs is directed generally parallel to the circuit board.
7. (Previously Amended) The LED module of Claim 1, wherein the number of contacts is greater than the number of LEDs.

Appl. No. : 09/693,548  
Filed : October 19, 2000

8. (Previously Amended) The LED module of Claim 7, wherein the number of contacts is one greater than the number of LEDs.
9. (Previously Amended) The LED module of Claim 1, wherein the surface area of the first side of the body is greater than a combined surface area of one side of all of the contacts.
10. (Previously Amended) The LED module of Claim 1, wherein each of the contacts has a bonding area wherein at least one of the leads of an associated LED is attached to the contact.
11. (Original) The LED module of Claim 10, wherein an overall surface of each contact is substantially larger than the bonding area of the contact.
12. (Original) The LED module of Claim 1, wherein the heat conducting surface behaves as a heat sink.
13. (Original) The LED module of Claim 1, wherein the dielectric layer comprises an epoxy.
14. (Previously Amended) The LED module of Claim 1, wherein the body is bendable.
15. (Previously Amended) The LED module of Claim 1, wherein the body has a thermal conductivity greater than about 100 W/mK.
16. (Previously Amended) The LED module of Claim 15, wherein the body comprises a metal.
17. (Previously Amended) The LED module of Claim 16, wherein the body comprises aluminum.
18. (Previously Amended) The LED module of Claim 15, wherein the body is electrically non-conductive.
19. (Previously Amended) The LED module of Claim 1, additionally comprising an electrically non-conductive flexible film disposed adjacent the contacts on a side of the contacts opposite the body.
20. (Previously Amended) The LED module of Claim 19, wherein the film comprises reflective film, and the reflective film extends outwardly from the module beyond the LEDs.
21. (Original) The LED module of Claim 20, wherein the film is attached to the module with at least one rivet.

22. (Previously Amended) The LED module of Claim 20 in combination with a second strip of reflective film that is attached to the heat conducting surface adjacent an edge of the circuit board, and the plurality of LEDs is disposed adjacent the edge of the circuit board so that the LEDs are positioned between the first reflective film and the second reflective film.

23. (Original) The LED module of Claim 1, wherein the module comprises five pre-packaged, pre-focused LED lamps and six contacts, and the LED lamps are disposed adjacent an edge of the circuit board.

24. (Original) The LED module of Claim 23, wherein the module is about .05 inches thick, 1 inch long, and 0.5 inches wide.

25. (Previously Amended) A self-contained illumination apparatus comprising an LED module in combination with a heat conductive base plate having a mount tab, the LED module being mounted onto the mount tab, the module comprising:

- a plurality of LEDs, each LED having at least one lead; and

- a circuit board, the circuit board comprising:

- a thin dielectric sheet;

- a plurality of electrically-conductive contacts on a first side of the dielectric sheet, each of said plurality of contacts being configured to mount a lead of an LED such that said plurality of LEDs is electrically connected; and

- a heat conductive body on a second side of said sheet, said body having a first portion in thermal communication with the plurality of contacts through said dielectric sheet, said first portion of said body having a surface area substantially larger than a contact area between the contacts and the dielectric sheet, said body having a second portion adapted to provide thermal contact with the heat conducting surface, whereby heat is transferred from the module to the heat conducting surface.

26. (Original) The self-contained illumination apparatus of Claim 25, wherein the LED module is mounted onto the mount tab with at least one rivet.

27. (Original) The self-contained illumination apparatus of Claim 25, wherein the base plate behaves as a heat sink.

28. (Original) The self-contained illumination apparatus of Claim 25 additionally comprising a housing substantially surrounding the LED module, the housing having a cavity, and the LED module positioned to direct light out of the cavity.

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29. (Original) The self-contained illumination apparatus of Claim 25, wherein the apparatus is mounted on a substantially vertical mount surface.

30. (Original) The self-contained illumination apparatus of Claim 29, wherein the mount surface comprises an end surface of a row of seats.

31. (Previously Amended) A channel illumination device comprising a plurality of the LED modules in combination with at least one channel defined by a plurality of wall surfaces and a back surface, wherein the LED modules are mounted on at least one of the surfaces of the channel illumination device, and wherein each LED module comprises:

a plurality of LEDs, each LED having at least one lead; and

a circuit board, the circuit board comprising:

a thin dielectric sheet;

a plurality of electrically-conductive contacts on a first side of the dielectric sheet, each of said plurality of contacts being configured to mount a lead of an LED such that said plurality of LEDs is electrically connected; and

a heat conductive body on a second side of said sheet, said body having a first portion in thermal communication with the plurality of contacts through said dielectric sheet, said first portion of said body having a surface area substantially larger than a contact area between the contacts and the dielectric sheet, said body having a second portion adapted to provide thermal contact with the heat conducting surface, whereby heat is transferred from the module to the heat conducting surface.

32. (Original) The channel illumination device of Claim 31, wherein the plurality of LED modules are electrically connected in parallel relative to each other.

33. (Original) The channel illumination device of Claim 32, wherein the LED modules are spaced at least about 1/2 inch from a top surface of the walls.

34. (Previously Amended) The channel illumination device of Claim 32, wherein the wall and back surfaces are coated with a diffusely-reflective coating.

35. (Previously Amended) The channel illumination device of Claim 32, wherein the modules are arranged to direct substantially all of the light emitted by the LEDs toward the wall and back surfaces.

36. (Previously Amended) The channel illumination device of Claim 35, wherein the wall and back surfaces are coated with a diffusely-reflective coating.

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37. (Previously Amended) The channel illumination device of Claim 31, wherein the at least one channel surface comprises a heat conducting surface.

38. (Previously Amended) A low profile modular lighting apparatus for conducting heat away from a light source of the apparatus and to a mounting surface, the apparatus comprising:

a plurality of light emitting diodes (LEDs); and

a circuit board comprising a thermally conductive main body and a plurality of electrically conductive contacts, each of the LEDs electrically communicating with at least one of the contacts in a manner so that the LEDs are configured in a series array;

wherein the plurality of contacts are arranged adjacent a first side of the main body and are in thermal communication with the first side of the main body, the main body electrically insulating the plurality of contacts relative to one another; and

wherein the circuit board is generally planar and a second side of the main body opposite the first side is generally flat to facilitate heat transfer from the main body to the mounting surface and so that the apparatus has a low profile upon the mounting surface.

39. (Original) The modular lighting apparatus of Claim 38, wherein the main body is electrically nonconductive.

40. (Original) The modular lighting apparatus of Claim 38, wherein the main body is electrically insulated from the contacts.

41. (Original) The modular lighting apparatus of Claim 40, wherein the main body is metallic.

42. (Original) The modular lighting apparatus of Claim 38, wherein the main body has a thermal conductivity greater than about 100 W/mK.

43. (Original) The modular lighting apparatus of Claim 42, wherein the contacts have a thermal conductivity greater than about 100 W/mK.

44. (Previously Added) The LED module of Claim 1, wherein the LEDs are configured to direct light in a direction generally coplanar with the circuit board.

The LED module of Claim 44, wherein the LEDs are arranged along a side edge of the circuit board.

46. (Previously Amended) The LED module of Claim 45, comprising LED packages that generally abut the side edge of the circuit board.

47. (Previously Added) The apparatus of Claim 38, wherein each of the LEDs electrically communicates with corresponding contacts at an attachment area defined on each contact, and an overall surface of the contact is substantially larger than the attachment area.

48. (Previously Added) A lighting apparatus, comprising:

a light emitting diode (LED) module mounted on a heat conductive base plate;  
the LED module comprising:

a plurality of LED packages, each package comprising an LED and at least one lead; and

a circuit board, comprising a thin dielectric sheet, and a plurality of electrically-conductive contacts on a first side of the dielectric sheet, each of the plurality of contacts being configured to mount a lead of an LED package such that the plurality of LEDs is series connected;

the heat conductive base plate being configured to be mounted on a generally vertical surface and comprising a mount tab;

a housing disposed on the base plate and having a generally downwardly directed opening;

wherein the LED module is attached to the mount tab so that the dielectric sheet is disposed between the mount tab and the plurality of contacts, and the mount tab is in thermal communication with the plurality of contacts through the dielectric sheet, whereby heat is transferred from the LED module to the heat conductive base plate, and the base plate is sized and adapted to behave as a heat sink for the heat transferred thereto from the LED module; and

wherein the LED module is arranged so that the LEDs direct light through the generally downwardly directed opening through the housing.

49. (Previously Added) The lighting apparatus of Claim 48, wherein the LEDs are arranged to direct light generally in a direction coplanar to the mount tab.

50. (Previously Added) The lighting apparatus of Claim 49, wherein the LED packages generally abut a side edge of the mount tab.

51. (Previously Added) The lighting apparatus of Claim 50, wherein the mount tab is angled about 20-45° relative to a body of the base plate.

52. (Previously Added) The lighting apparatus of Claim 51, wherein the mount tab is angled about 33° relative to the body of the base plate.

53. (Previously Added) The lighting apparatus of Claim 48, wherein the LED module comprises a thermally-conductive base member attached to a second side of the dielectric sheet, and the base member is directly attached to the mount tab.

54. (Previously Amended) An illuminated signage system, comprising:  
at least one channel defined by a plurality of wall surfaces and a back surface;  
a translucent material extending over the channel; and  
a plurality of light emitting diode (LED) modules disposed within the channel and arranged on at least one of the channel surfaces; the LED modules being electrically connected to one another in parallel, each of the LED modules comprising:

a plurality of LEDs, each LED having at least one lead; and

a circuit board, comprising a thin dielectric portion, and a plurality of electrically-conductive contacts on a side of the dielectric portion, each of the plurality of contacts being configured to mount a lead of an LED such that the plurality of LEDs are electrically connected;

wherein the LED modules that are attached to the at least one channel surface are mounted so that the dielectric portion is disposed between the channel surface and the plurality of contacts, and the channel surface is in thermal communication with the plurality of contacts through the dielectric portion so that heat is transferred from the LED module to the channel surface.

55. (Previously Amended) The signage system of Claim 54, wherein each of the LED modules additionally comprise a thermally conductive base member connected to a second side of the dielectric portion, the base member comprising a generally flat mounting surface configured to be connected to the channel surface.

56. (Previously Added) The signage system of Claim 54, wherein each of the plurality of LED modules additionally comprises a reflective layer disposed atop the module so that the module is configured to direct light from the LED in a direction generally coplanar to the contacts.

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57. (Previously Amended) The signage system of Claim 56, wherein the LED modules are arranged so that light from the LEDs is directed toward the wall surfaces and bottom surface.

58. (Previously Amended) The signage system of Claim 57, wherein the wall surface and bottom surface are coated with a diffusely-reflective coating.

59. (Previously Amended) An illuminated signage system, comprising:  
at least one channel defined by a plurality of walls, a back surface, and a front, at least a first one of the walls being thermally conductive, the front comprising a translucent material;

at least one lighting module comprising a plurality of light emitting diodes (LEDs) arranged in series on a thermally conductive base;

wherein the at least one module is mounted on the thermally conductive first wall and arranged so that the LEDs do not directly illuminate the translucent front of the channel, and so that heat from the LEDs flows from the module to the thermally conductive first wall.

60. (Previously Added) The signage system of Claim 59, wherein the at least one module comprises a plurality of LED packages and a circuit board, each package comprising an LED and at least one lead, the circuit board comprising a thin dielectric sheet and a plurality of electrically-conductive contacts disposed on a first side of the dielectric sheet, each of the contacts being configured to mount a lead of an LED package such that the plurality of LEDs is series connected.

61. (Previously Added) The signage system of Claim 60, wherein the circuit board is generally planar and comprises a generally flat mounting surface so that the module has a low profile when mounted on the first wall.

62. (Previously Amended) The signage system of Claim 60, comprising a plurality of modules arranged along the thermally conductive first wall so that the LEDs do not directly illuminate the translucent front.

63. (Previously Added) The signage system of Claim 62, wherein the plurality of modules are arranged electrically in parallel relative to one another.

64. (Previously Amended) A light emitting diode (LED) module for mounting on a heat conducting surface that is substantially larger than the module, the module comprising:



a plurality of LEDs;

a thin dielectric portion;

a plurality of electrically-conductive contacts on a first side of the dielectric portion, each of said plurality of contacts being configured to mount an LED such that said plurality of LEDs are electrically connected to one another; and

a heat conductive body on a second side of said portion, said body having a first side in thermal communication with the plurality of contacts through said dielectric portion, said first side of said body having a surface area substantially larger than a contact area between the contacts and the dielectric portion, a second side of said body having a surface complementary to the heat conducting surface to provide thermal contact with the heat conducting surface, whereby heat is transferred from the LEDs to the heat conducting surface.

65. (Previously Added) An LED module as in Claim 64, wherein the surface of the second side of the body is generally flat.

66. (Previously Added) An LED module as in Claim 65, wherein the contacts are substantially flat and coplanar relative to each other.

67. (Previously Added) An LED module as in Claim 66, wherein the body is substantially flat and parallel to the contacts.

68. (Previously Added) An LED module as in Claim 64, wherein the heat conducting surface behaves as a heat sink.

69. (Previously Amended) An LED module as in Claim 64, wherein the dielectric portion comprises an epoxy.

70. (Previously Added) An LED module as in Claim 64, wherein the body has a thermal conductivity greater than about 100 W/mK.

71. (Previously Added) An LED module as in Claim 70, wherein the body comprises a metal.

72. (Previously Added) An LED module as in Claim 71, wherein the body comprises aluminum.

73. (Previously Amended) A channel illumination device comprising a plurality of the LED modules of Claim 64 in combination with at least one channel defined by a plurality of

wall surfaces and a back surface, wherein the LED modules are mounted on at least one of the surfaces of the channel illumination device.

74. (Previously Added) A channel illumination device as in Claim 73, wherein the plurality of LED modules are electrically connected in parallel relative to each other.

75. (Previously Amended) A channel illumination device as in Claim 73, wherein the at least one channel surface comprises a heat conducting surface.

76. (Previously Amended) An illuminated sign, comprising:

a body of thermally conductive material having a thermal conductivity greater than about 100W/mK, said body having a periphery in the shape of an element of said sign; and

a plurality of light emitting diode (LED) modules disposed on an interior side of said body, the LED modules being electrically connected to one another in parallel, each of the LED modules comprising:

a plurality of LEDs;

a thin dielectric member; and

a plurality of electrically-conductive contacts on a side of the dielectric member, each of the plurality of contacts being configured to mount an LED such that the plurality of LEDs are electrically connected;

wherein each of the LED modules that are attached to the body are mounted so that the dielectric member is disposed between the body and the plurality of contacts, and the body is in thermal communication with the plurality of contacts through the dielectric member so that heat is transferred from the LED module to the body.

77. (Previously Amended) An illuminated sign as in Claim 76, wherein the dielectric member is substantially planar.

78. (Previously Added) An illuminated sign as in Claim 77, wherein the contacts are substantially flat and coplanar relative to each other.

79. (Previously Amended) An illuminated sign as in Claim 76 additionally comprising a thermally conductive member on a second side of the dielectric member.

80. (Previously Added) An illuminated sign as in Claim 79, wherein the thermally conductive member has a thermal conductivity greater than about 100 W/mK.

81. (Previously Added) An illuminated sign as in Claim 80, wherein the thermally conductive member is substantially rigid.

Please add the following new claims:

82. (New) An illuminated signage system, comprising:  
at least one channel defined by a plurality of wall surfaces and a back surface; and  
a plurality of light emitting diode (LED) modules disposed within the channel and  
arranged on at least one of the channel surfaces, the LED modules being electrically  
connected to one another in parallel, each of the LED modules comprising:

a plurality of LEDs, each LED having at least one lead; and

a circuit board, comprising a thin dielectric portion, and a plurality of  
electrically-conductive contacts on a side of the dielectric portion, the plurality of  
contacts being configured to mount respective leads of an LED such that the  
plurality of LEDs are electrically connected;

wherein the LED modules that are attached to the at least one channel surface are  
mounted so that the channel surface is in thermal communication with the plurality of  
contacts so that heat is transferred from the LED module to the channel surface.

83. (New) The illuminated signage system of Claim 82 additionally comprising a  
translucent material extending over the channel.

84. (New) The illuminated signage system of Claim 82, wherein the dielectric portion  
is disposed between the channel surface and the plurality of contacts.

85. (New) The illuminated signage system of Claim 82, wherein the circuit board  
comprises a generally flat surface generally complementary to a channel surface.

86. (New) The illuminated signage system of Claim 82, wherein the circuit board is  
bendable.

87. (New) An illuminated signage system, comprising:

at least one channel defined by a plurality of wall surfaces and a back surface; and

a plurality of light emitting diode (LED) modules disposed within the channel and  
attached to at least one of the channel surfaces, the LED modules being electrically  
connected to one another in parallel, each of the LED modules comprising:

a plurality of LEDs;

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a circuit board comprising a dielectric portion, the LEDs disposed on a first side of the dielectric portion and arranged such that the plurality of LEDs are electrically connected in series; and

a heat conductive metal on a second side of the dielectric portion, which heat conductive metal draws LED-generated heat from the first side for dissipation in the channel.

88. (New) The illuminated signage system of Claim 87, wherein the circuit board is interposed between the LEDs and the channel surface.

89. (New) The illuminated signage system of Claim 87, wherein a translucent diffuser extends over the channel.

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### REMARKS

The above amendment to the claims adds New Claims 82-89. Applicants believe these claims are patentable over the cited references. Claims 1-81 have not been changed, except that a minor typographical error in Claim 6 has been corrected. Applicants' counsel noted that the status of some of the claims had not been properly labeled in the Response to Office Action filed by Applicants on July 19, 2003. Proper status labels for all pending claims are included in this Supplemental Amendment.

Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: 7/29/03

By: 

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U.S. DEPARTMENT OF COMMERCE  
PATENT AND TRADEMARK OFFICEATTY. DOCKET NO.  
PERMLT.019AAPPLICATION NO.  
09/693,548

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INFORMATION DISCLOSURE STATEMENT  
BY APPLICANTAPPLICANT  
John Popovich, et al.FILING DATE  
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2875

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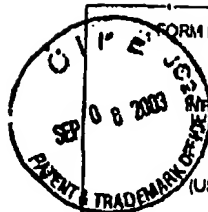
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